Claims

1. A nucleic acid molecule encoding a protein which is present in plant cells in starch granule-bound form as well as in soluble form, selected from the group consisting of:
   (a) nucleic acid molecules encoding a protein with the amino acid sequence indicated in Seq ID No. 2;
   (b) nucleic acid molecules comprising the coding region of the nucleotide sequence indicated under Seq ID No. 1;
   (c) nucleic acid molecules hybridizing to the nucleic acid molecules mentioned under (a) or (b);
   (d) nucleic acid molecules the sequence of which due to the genetic code is degenerated when compared to the sequences of the nucleic acid molecules mentioned under (a) or (b); and
   (e) fragments, derivatives or allelic variants of the nucleic acid molecules mentioned under (a) to (d).

2. A vector containing a nucleic acid molecule of claim 1.

3. The vector of claim 2, wherein the nucleic acid molecule is linked to regulatory elements ensuring transcription in eukaryotic and prokaryotic cells.

4. A host cell, which is genetically modified with a nucleic acid molecule of claim 1 or with a vector of claim 2 or 3.

5. The host cell of claim 4, being a transgenic plant cell.

6. A plant containing the plant cells of claim 5.

7. Starch obtainable from the plant cells of claim 5 or from a plant of claim 6.

8. A method for the production of a protein, which is present in the plant cells in starch granule-bound form as well as in soluble form, in which a host cell of claim 4 is cultivated under conditions allowing for the expression of

the protein and in which the protein is isolated from the cells and/or the culture medium.

9. A protein encoded by a nucleic acid molecule of claim 1 or obtainable by the method of claim 8.

10. An antibody specifically recognizing the protein of claim 9.

11. A nucleic acid molecule with a length of at least 15 nucleotides which specifically hybridizes to a nucleic acid molecule of claim 1.

12. A DNA molecule encoding an antisense-RNA complementary to the transcripts of a DNA molecule according to claim 1.

13. A DNA molecule encoding an RNA with ribozyme activity which specifically cleaves transcripts of a DNA molecule of claim 1.

14. A DNA molecule encoding an RNA which upon expression in a plant cell leads to a reduction of the expression of a nucleic acid molecule of claim 1, due to a cosuppression effect.

15. A vector containing a DNA molecule of any one of claims 12 to 14.

16. The vector of claim 15, wherein the DNA molecule is combined with regulatory DNA elements ensuring transcription in plant cells.

17. A host cell containing a DNA molecule of any one of claims 12 to 14 or a vector of claim 15 or 16.

18. A transgenic plant cell containing a DNA molecule of any one of claims 12 to 14 in combination with regulatory DNA elements ensuring transcription in plant cells.

19. The transgenic plant cell of claim 18, in which the activity of at least one further enzyme involved in the starch biosynthesis or modification is reduced when compared to non-transformed plants.

20. The transgenic plant cell of claim 19 in which the activity of a branching enzyme is reduced.

21. The transgenic plant cell of claim 20 in which the activity of a starch granule-bound starch synthase of the isotype I (GBSS I) is reduced.

22. A transgenic plant obtainable by regenerating a plant cell of any one of claims 18 to 21.

23. Starch obtainable from plant cells of any one of claims 18 to 21 or from plants of claim 22.

24. An RNA molecule obtainable by transcription of a DNA molecule of any one of claims 12 to 14.

25. A method for the production of transgenic plant cells synthesizing a modified starch characterized in that the amount of proteins of claim 10, which are synthesized in the cells in endogenous form, is reduced in the cells.

26. The method of claim 25 characterized in that the reduction of the amount of proteins of claim 10 in the cells is caused by an antisense effect.

27. The method of claim 25 characterized in that the reduction of the amount of proteins of claim 10 in the cells is caused by a ribozyme effect.

28. The method of claim 25 characterized in that the reduction of the amount of proteins of claim 10 in the cells is caused by a cosupression effect.

29. The method of any one of claims 25 to 28, wherein the enzyme activity of at least one further enzyme involved in the starch biosynthesis and/or modification is reduced.

30. The method of claim 29 wherein the enzyme is a branching enzyme.

31. The method of claim 29 wherein the enzyme is a starch granule-bound starch synthase of the isotype I (GBSSI).

32. A plant cell obtainable by a method of any one of claims 25 to 31.

33. A transgenic plant obtainable by regenerating the plant cells of claim 32.

34. Starch obtainable from plant cells of claim 32 or a plant of claim 33.

35. The starch of claim 34 characterized in that it is derived from potato.

36. Propagation material of plants of claim 6 containing plant cells of claim 5.

37. The propagation material of plants of claim 22 or 32, containing plant cells of any one of claims 18 to 21 or of claim 32.

38. The transgenic plant of claim 22 or 33 which is a potato plant.

39. Tuber of a potato plant of claim 38.

40. The tuber of claim 39 which in comparison to tubers of wildtype plants exhibits a reduced cold sweetening.